

REMARKS

This Amendment is filed in response to the Office Action dated May 19, 2009. For the following reasons, this application should be allowed and the case passed to issue. No new matter is introduced by this amendment. New claims 37-41 are supported by the specification and claims as originally filed. New claims 37-41 read on elected species A.

Claims 37-41 are pending in this application. Claims 5-7 and 12-36 were withdrawn pursuant to a restriction requirement. Claims 1-4 and 8-11 were rejected. Claims 1-36 are canceled in this response without prejudice. Claims 37-41 are added in this response.

Restriction

The Examiner withdrew elected claims 5-7 as belonging to unelected embodiments, in addition to withdrawing unelected claims 12-36.

Claim Rejections Under 35 U.S.C. § 103

Claims 1, 3, 4, 8, 9, and 11 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Zhao (US 6,198,170) in view of Chittipeddi et al. (US 5,986,343).

Claims 2 and 10 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Zhao and Chittipeddi et al. and further in view of Langley (US 5,686,762).

These rejections are traversed, and reconsideration and withdrawal thereof respectfully requested.

Zhao, Chittipeddi et al., and Langley, whether taken in combination, or taken alone, do not suggest the claimed semiconductor device because the cited references do not suggest a plurality of bonding pads, wherein each of the bonding pads has a first metal and a plurality of second metals, each of the plurality of second metals has a linear shape, is arranged under the

first metal, and is connected with the first metal; wherein in plan view, the bonding pads are arranged in order and on a long side direction of the second metal, as required by claim 37.

The semiconductor device according to the present invention has a plurality of bonding pads and a passivation film. Each of the plurality of bonding pads has a first metal and a plurality of second metals. Each of the plurality of second metals has a linear shape, is arranged directly under the first metal, and is connected with the first metal. The passivation film covers a side wall and a top surface of the first metal of each of the plurality of bonding pads, and has a plurality of openings. Each of the plurality of openings exposes a part of the top surface of the first metal of each of the plurality of bonding pads. Further in plan view, the plurality of bonding pads are arranged in order and located in a long side direction of the second metal.

Because the plurality of bonding pads are arranged in order and located in the long side direction of the second metal, a probe needle can contact the first metal in a direction perpendicular to the long-side direction of the second metal during probing. In addition, because the plurality of second metals connected with the first metal are arranged directly under the first metal, a crack in the structure under the bonding pads caused by the probing can be prevented.

Moreover, a bonding tool contacts the first metal in a direction perpendicular to the long-side direction of the second metal during bonding. In this situation, the second metals can prevent the crack from occurring in the structure under the bond pads caused by the bonding.

Furthermore, because each of the plurality of second metals has a linear shape, even if the second metals are formed at the same time as an original via with a small via for an inner circuit, the top surfaces of the second metals are not subject to dishing, and the heights of the second metals are almost even. This allows the heights of the surface of the first metal to be made even. As a result, reliable probing or bonding to the first metal can be performed.

Zhao disclose a large diameter via pad structure (412) processed by a chemical-mechanical polishing (CMP) process. The large-diameter via pad structure (412) is susceptible to dishing by the CMP process. As a result, the height of the copper bonding pad (410) formed on the via pad structure (412) is not even, leading to problems with bonding and probing.

Zhao fails to disclose the plurality of bonding pads, as required by claim 37, and thus, also fails to disclose the direction in which the pads are arranged. Zhao further fails to disclose the linear shaped second metals connected to the first metal, as required by claim 37.

Chittipeddi et al. and Langley do not cure the deficiencies of Zhao as they do not disclose a plurality of second metals, each of the plurality of second metals has a linear shape, is arranged under the first metal, and is connected with the first metal; and in plan view, the bonding pads are arranged in order and on a long side direction of the second metal, as required by claim 37.

Obviousness can be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either explicitly or implicitly in the references themselves or in the knowledge readily available to one of ordinary skill in the art. *In re Kotzab*, 217 F.3d 1365, 1370 55 USPQ2d 1313, 1317 (Fed. Cir. 2000); *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988); *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). There is no suggestion in Zhao, Chittipeddi et al., and Langley to modify semiconductor device of Zhao to provide semiconductor device, as required by claim 37.

The only teaching of the claimed semiconductor device is found in Applicants' disclosure. However, the teaching or suggestion to make a claimed combination and the reasonable expectation of success must not be based on applicant's disclosure. *In re Vaack*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

The dependent claims are allowable for at least the same reasons as independent claim 37, and further distinguish the claimed semiconductor device. For example, the cited references do not suggest a width W and interval D of a bottom of the second metals satisfy a relation: $W \leq D \leq 2W$, as required by claim 38.

In view of the above amendments and remarks, Applicants submit that this application should be allowed and the case passed to issue. If there are any questions regarding this Amendment or the application in general, a telephone call to the undersigned would be appreciated to expedite the prosecution of the application.

To the extent necessary, a petition for an extension of time under 37 C.F.R. § 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

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